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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/633,330	08/07/2000	H. John Caulfield	10050-102	3407

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EXAMINER

KIBLER, VIRGINIA M

ART UNIT

PAPER NUMBER

2623

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/633,330

Applicant(s)

CAULFIELD, H. JOHN

Examiner

Virginia M Kibler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16 and 17 is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-9 and 11-15 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment received on 2/11/04 has been entered. Claims 1-17 remain pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 4, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) in view of Lyon et al. (5,903,884).

Regarding claim 1, Errico et al. ("Errico") discloses a process for training a pattern recognition system including providing a training set of objects each classified in two or more classes (Figures 4 and 5; Col. 4, lines 44-52; Col. 6, lines 18-24), taking data from each of the objects (Col. 1, lines 46-61), selecting a first discriminant space and computing discriminant values from the data, (Col. 4, lines 53-67 and Col. 5, lines 1-40) plotting the values in the discriminant space (Figure 4), establishing a decision boundary associated with the discriminant space, setting the decision boundary and applying a decision rule wherein at least one object in the training set is separated and correctly classified (Col. 6, lines 18-35), storing the first discriminant space, corresponding boundary and decision rule (Col. 7, lines 46-51), and repeating the above steps (Col. 6, lines 36-45). Errico discloses modifying the first decision boundary to a refined decision boundary that correctly classifies the overlapping objects (Figure

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5). Errico does not appear to recognize removing the correctly classified objects from the training set, thereby creating a remaining set of objects. However, Lyon et al. ("Lyon") teaches that it is known to remove the correctly classified objects and repeat training with the remaining (Col. 2, 31-37). Therefore, it would have been an obvious to one of ordinary skill in the art at the time of the invention to have modified the iterative process disclosed by Errico to include repeating without the correctly classified objects as taught by Lyon because there is little advantage to be gained by further training on a correctly classified object and removing the correctly classified would save time and prevent overtraining (Col. 4, lines 17-23).

Regarding claim 3, Errico discloses selecting a different discriminant space (Col. 4, lines 44-52).

Regarding claim 4, Errico discloses training on the overlapping objects until a number is reached (Col. 4, lines 10-26).

Regarding claim 15, Errico discloses accumulating objects misclassified by the existing system (Figure 4; Col. 6, lines 25-35) and using these and applying the training process in order to re-classify (Figure 5; Col. 6, lines 36-45).

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) and Lyon et al. (5,903,884) as applied to claim 1 above, and further in view of Akiyama et al. (5,602,938).

Regarding claim 2, Errico discloses defining a range of positions of the decision boundary from a first location, that properly classifies all objects of one class, to a second location that properly classifies all objects of a second class, and positioning the decision boundary at any point from the first to the second locations (Figures 4 and 5; Col. 4, lines 27-32).

Errico does not appear to recognize the distance or margin between the two classes being maximized or minimized. However, Akiyama et al. ("Akiyama") teaches that it is known to maximize the distance between two classes (Col. 2, lines 5-14). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the distance between classes disclosed by Errico and Lyon to include maximizing the distances between classes as taught by Akiyama because it increases the accuracy of recognition by emphasizing the differences of each class (Col. 2, lines 5-14).

5. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) in view of Lyon et al. (5,903,884) as applied to claim 1 above, and further in view of Watanabe et al. (5,754,681).

Regarding claim 7, the arguments analogous to those presented above for claim 1 are applicable to claim 7. Errico and Lyon do not appear to recognize applying all in parallel. However, Watanabe et al. ("Watanabe") teaches that it is known to apply the discriminant functions for each class in parallel (Figure 1; Col. 7, lines 66-67, Col. 8, lines 1-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the discriminant functions for each class as disclosed by Akiyama to include applying all in parallel as taught by Watanabe because it shortens the processing time required to classify an object and thereby increases efficiency.

Regarding claim 8, Errico discloses combining groups of all objects of at least one class (Col. 3, lines 28-37).

Regarding claim 9, Errico discloses the step of applying classifies a portion of one class from the unclassified objects (Figure 5).

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6. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginsburg (3,993,976), in view of Filipski (4,975,975).

Regarding claim 11, Ginsburg discloses modulating a coherent light beam by each of the patterns (Col. 4, lines 56-61; Col. 2, lines 34-42), optical Fourier transforming the modulated coherent light beam (Col. 4, lines 61-67), filtering 14 the Fourier transformed beam thereby providing a masked output, optical Fourier inverse transforming 20 of the masked output, thereby forming an optical signal positioned in a plane that corresponds to the corresponding positions in the x,y plane (Col. 4, lines 27-31), sensing the optical output, applying a threshold to the sensed optical outputs 22 (Col. 6, lines 45-54) thereby determining the x,y positions of the sensed optical signals that exceed the threshold. Ginsburg does not appear to recognize the set of patterns being known to be in two or more classes or removing those patterns from the remainder of the training set. However, Filipski teaches that it is known for the set of patterns to be in two or more classes (Figure 16) and to remove the classified patterns from the training set and repeat the training process on the remainder (Abstract, lines 5-16), thereby training the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the process disclosed by Ginsburg to include training on patterns known to be in two or more classes and recursive training as taught by Filipski because it provides a pattern recognition system with increased accuracy.

Regarding claim 12, the arguments analogous to those presented above for claim 11 are applicable to claim 12. Ginsburg discloses introducing unclassified patterns and retrieving the stored masks 14 (Abstract).

7. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginsburg (3,993,976) in view of Filipski (4,975,975) as applied to claim 11 above, and further in view of Watanabe et al. (5,754,681).

Regarding claim 13, Ginsburg and Filipski disclose applying the classification in succession rather than in parallel. However, Watanabe teaches that it is known to apply the classification in parallel (Figure 2) wherein each application provides an output classified grouping (Col. 8, lines 7-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the successive classification disclosed by Ginsburg and Filipski to include applying all in parallel as taught by Watanabe because it shortens the processing time required to classify an object and thereby increases efficiency.

Regarding claim 14, Filipski discloses producing the logical determination that all of one class has been separated from the unclassified objects (Col. 7, lines 26-43).

Allowable Subject Matter

8. Claims 16 and 17 are allowed.

9. Claims 5, 6, and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

10. Applicant's arguments filed 2/11/04 have been fully considered but they are not persuasive.

Summary of Applicant's Argument: Errico's disclosure teaches away from Applicant's claimed approach (as recited in claim 1) that involves defining a classifier on the whole training set and then using that training set to define initial clusters. Errico chooses all of his clusters at once and uses heuristics to do so. In the present invention, the training set is unknown until after the first set of clusters is defined. Lyon allows for experimental correction of classifiers, whereas the presently claimed invention produces classifiers that require no correction or adjustment. Redefining the training set in accordance with the present invention is not obvious because the SVM does not employ an important concept of the presently claimed invention, removing correctly classified objects from the training set. Regarding claims 7-9, the discriminant design of the presently claimed invention is dependent and sequential, while Watanabe teaches an independent and parallel design. The presently claimed invention employs nonlinear combining in the decision methodology, while Watanabe teaches choosing the best response. Regarding claims 11 and 12, Filipski is directed to a unique and narrow range of pattern recognition problems called character recognition. Filipski uses tree structure, whereas the present invention does not employ tree structures at all.

Examiner's Response: Errico's disclosure does not teach away from Applicant's invention. Claim language recites, "providing a training set of objects each classified in two or more classes." This means there is a prior knowledge of different classes, in other words there must be some known classes (clusters) in advance to conclude that objects in the training set are

classified in two or more classes. The applicant's invention (same as the prior art's teaching) is also directed to correcting the clusters as detailed in claim 1. It is further submitted that claim language does not recite "SVM" or any related algorithms. Claimed invention does not exclude employing randomness or heuristics. The combined teachings of Errico and Lyon in the same environment of providing training set for pattern recognition meet claimed language recited in claims 1, 3-4, and 15. Watanabe discloses applying discriminant functions for each class in parallel. The claims do not recite the discriminant design being dependent and sequential or employing nonlinear combining in the decision methodology. The combined teachings of Errico, Lyon, and Watanabe meet the claimed language recited in claims 7-9. Filipski is in the same environment of providing a training set for pattern recognition. The teachings of Filipski are not relied on for decision-making. Filipski teaches that it is known for the set of patterns to be in two or more classes and to remove the classified patterns from the training set and repeat the training process on the remainder. The combined teachings of Ginsburg and Filipski meet the claimed language as recited in claims 11 and 12.

Conclusion

11. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Virginia Kibler
4/29/04

**MEHRDAD DASTOURI
PRIMARY EXAMINER**

